

AMENDMENTS TO THE CLAIMS:

Please amend the claims as follows:

1. (Currently Amended) A steel for use in a high strength pinion shaft comprising:
~~comprising, on the basis of mass%;~~

~~C:~~ 0.45wt% - 0.55wt% C; [[,]]

~~Si:~~ 0.10wt% - 0.50wt% Si; [[,]]

~~Mn:~~ 0.50wt% - 1.20wt% Mn; [[,]]

~~P:~~ 0.025wt% or less P; [[,]]

~~S:~~ 0.025wt% or less S; [[,]]

~~Mo:~~ 0.15wt% - 0.25wt% Mo; [[,]]

~~B:~~ 0.0005wt% - 0.005wt% B; [[,]]

~~Ti:~~ 0.005wt% - 0.010wt% Ti; ~~and~~

~~N:~~ 0.015wt% or less N; [[,]] ~~satisfying the following relations 1 and 2 and~~

~~the balance comprising Fe and inevitable impurities:~~ impurities.

~~Relation 1~~

wherein $0.80 \leq Ceq \leq 0.95$, where $Ceq = C + 0.07 \times Si + 0.16 \times Mn + 0.20 \times Cr +$

$0.72 \times Mo$, and

~~Relation 2~~

wherein $f \text{ value} \leq 1.0$, where $f \text{ value} = 1.78 - 3.2 \times C + 0.05 \times Si - 0.60 \times Mn - 0.55 \times Cu -$

$0.80 \times Ni - 0.75 \times Cr$.

2. (Currently Amended) A steel for use in a high strength pinion shaft according to claim 1, wherein further comprising one or more of Cu: 0.50wt% or less Cu, Ni: 0.50wt% or less Ni

and ~~Cr: 0.50wt% or less~~ Cr ~~is contained~~ instead of a portion of ~~the balance of~~ said Fe described above.

3. (Currently Amended) A steel for use in a high strength pinion shaft according to claim 1, ~~wherein further comprising~~ one or more of ~~Nb: 0.20wt% or less~~ Nb, ~~Ta: 0.20wt% or less~~ Ta, ~~Zr: 0.10wt% or less~~ Zr and ~~Al: 0.10wt% or less~~ Al ~~is contained~~ instead of a portion of ~~the balance of~~ said Fe described above.

4. (Currently Amended) A steel for use in a high strength pinion shaft according to claim 2, ~~wherein further comprising~~ one or more of ~~Nb: 0.20wt% or less~~ Nb, ~~Ta: 0.20wt% or less~~ Ta, ~~Zr: 0.10wt% or less~~ Zr and ~~Al: 0.10wt% or less~~ Al ~~is contained~~ instead of a portion of ~~the balance of~~ said Fe described above.

5. (Currently Amended) A steel for use in a high strength pinion shaft comprising:
~~comprising, on the basis of mass%;~~

~~C: 0.45wt% - 0.55wt%~~ C; [[,]]

~~Si: 0.10wt% - 0.50wt%~~ Si; [[,]]

~~Mn: 0.50wt% - 1.20wt%~~ Mn; [[,]]

~~P: 0.025wt% or less~~ P; [[,]]

~~S: 0.025wt% or less~~ S; [[,]]

~~Mo: 0.15wt% - 0.25wt%~~ Mo; [[,]]

~~B: 0.0005wt% - 0.005wt%~~ B; [[,]]

~~Ti: 0.005wt% - 0.010wt%~~ Ti; ~~and~~

~~N: 0.015wt% or less~~ N; [[,]] ~~satisfying the following relations 1 and 2 and~~

the balance comprising Fe and ~~inevitable impurities:~~ impurities,

~~in which the tissue~~ wherein the steel after hot rolling is comprises a 3-phase texture of ferrite + pearlite + bainite,

wherein the ferrite area ratio is 40% or less,

and wherein the maximum pearlite block size is 100 μm or less in a circle-equivalent diameter,

wherein the hardness after hot rolling is 24 to 30 HRC,

wherein the surface hardness after high frequency hardening is 650 HV or higher, and

wherein the old austenite crystal grain size in the hardened layer is 8 or more in view of grain size number[[;]] ,

Relation 1

wherein $0.80 \leq \text{Ceq} \leq 0.95$, where $\text{Ceq} = \text{C} + 0.07 \times \text{Si} + 0.16 \times \text{Mn} + 0.20 \times \text{Cr} + 0.72 \times \text{Mo}$, and

Relation 2

wherein $f \text{ value} \leq 1.0$, where $f \text{ value} = 1.78 - 3.2 \times \text{C} + 0.05 \times \text{Si} - 0.60 \times \text{Mn} - 0.55 \times \text{Cu} - 0.80 \times \text{Ni} - 0.75 \times \text{Cr}$,

6. (Currently Amended) A steel for use in a high strength pinion shaft according to claim 5, wherein further comprising one or more of ~~Cu~~: 0.50wt% or less Cu, ~~Ni~~: 0.50wt% or less Ni and ~~Cr~~: 0.50wt% or less Cr ~~is contained~~ instead of a portion of ~~the balance of~~ said Fe described above.

7. (Currently Amended) A steel for use in a high strength pinion shaft according to claim 5, wherein further comprising one or more of ~~Nb~~: 0.20wt% or less Nb, ~~Ta~~: 0.20wt% or less Ta, ~~Zr~~: 0.10wt% or less Zr and ~~Al~~: 0.10wt% or less Al ~~is contained~~ instead of a portion of ~~the balance of~~ said Fe described above.

8. (Currently Amended) A steel for use in a high strength pinion shaft according to claim 6, ~~wherein further comprising~~ one or more of ~~Nb~~: 0.20wt% or less ~~Nb~~, ~~Ta~~: 0.20wt% or less ~~Ta~~, ~~Zr~~: 0.10wt% or less ~~Zr~~ and ~~Al~~: 0.10wt% or less ~~Al~~ ~~is contained~~ instead of a portion of the balance of ~~said~~ Fe ~~described above~~.

9. (Currently Amended) A method of manufacturing a steel for use in a high strength pinion shaft in which a steel ~~comprising: comprising, on the basis of mass%;~~

~~C~~: 0.45wt% - 0.55wt% ~~C~~; [[,]]

~~Si~~: 0.10wt% - 0.50wt% ~~Si~~; [[,]]

~~Mn~~: 0.50wt% - 1.20wt% ~~Mn~~; [[,]]

~~P~~: 0.025wt% or less ~~P~~; [[,]]

~~S~~: 0.025wt% or less ~~S~~; [[,]]

~~Mo~~: 0.15wt% - 0.25wt% ~~Mo~~; [[,]]

~~B~~: 0.0005wt% - 0.005wt% ~~B~~; [[,]]

~~Ti~~: 0.005wt% - 0.010wt% ~~Ti~~; ~~and~~

~~N~~: 0.015wt% or less ~~N~~; [[,]] ~~satisfying the following relations 1 and 2 and~~

the balance comprising Fe and ~~inevitable impurities~~: impurities, is fabricated or worked under a draft ratio at an area reduction of 10% or more, and at a temperature of 850°C or ~~lower~~: lower.

~~Relation 1~~

wherein $0.80 \leq Ceq \leq 0.95$, where $Ceq = C + 0.07 \times Si + 0.16 \times Mn + 0.20 \times Cr + 0.72 \times Mo$, and

~~Relation 2~~

wherein $f \text{ value} \leq 1.0$, where $T_{Tr} = 2.78 - 3.2 \times C + 0.05 \times Si - 0.60 \times Mn - 0.55 \times Cu - 0.80 \times Ni - 0.75 \times Cr$,

10. (Currently Amended) A method of manufacturing a steel for use in a high strength pinion shaft according to claim 9, ~~wherein further comprising~~ one or more of ~~Cu: 0.50wt% or less Cu, Ni: 0.50wt% or less Ni and Cr: 0.50wt% or less Cr~~ is contained instead of a portion of ~~the balance of said Fe described above.~~

11. (Currently Amended) A method of manufacturing a steel for use in a high strength pinion shaft according to claim 9, ~~wherein further comprising~~ one or more of ~~Nb: 0.20wt% or less Nb, Ta: 0.20wt% or less Ta, Zr: 0.10wt% or less Zr and Al: 0.10wt% or less Al~~ is contained instead of a portion of ~~the balance of said Fe described above.~~

12. (Currently Amended) A method of manufacturing a steel for use in a high strength pinion shaft according to claim 10, ~~wherein further comprising~~ one or more of ~~Nb: 0.20wt% or less Nb, Ta: 0.20wt% or less Ta, Zr: 0.10wt% or less Zr and Al: 0.10wt% or less Al~~ is contained instead of a portion of ~~the balance of said Fe described above.~~

13. (New) A steel for use in a high strength pinion shaft according to claim 1, wherein a ferrite ratio of said steel comprises 40% or less.

14. (New) A steel for use in a high strength pinion shaft according to claim 1, wherein a hardness of said steel after hot rolling comprises a range of 24 HRC to 30 HRC.

15. (New) A steel for use in a high strength pinion shaft according to claim 1, wherein a surface hardness of said steel comprises 650 HV or more.
16. (New) A steel for use in a high strength pinion shaft according to claim 1, wherein said steel comprises an old austenite crystal grain size of 8 or more.
17. (New) A method of manufacturing a steel for use in a high strength pinion shaft according to claim 9, wherein said steel is fabricated or work under a temperature in a range of 700°C to 850°C.
18. (New) A steel for use in a high strength pinion shaft according to claim 1, wherein a torsional strength of said steel comprises 1670 Mpa to 1800 Mpa.
19. (New) A steel for use in a high strength pinion shaft according to claim 1, wherein a wear loss of said steel comprises 0.002g to 0.004g.